AMSAT News Service Weekly Bulletins
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Date: 1993-04-10
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SB SAT @ AMSAT $ANS-100.01
STS-56/SAREX MISSION A GO!

HR AMSAT NEWS SERVICE BULLETIN 100.01 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.01

STS-56 SAREX Mission Lift-Off Described As Spectacular

The STS-56 Space Shuttle Discovery made a spectacular night time lift off on 08-APR-93 at 05:28:59.95 UTC. As STS-56 worked its way north along the East Coast for its high inclination orbit (57 deg), N3KVQ reported that from his Annapolis, MD QTH he was able to see Discovery come into view and streak across the night sky. N3KVQ noted that the Shuttle Discovery appeared to be as bright at the planet Jupiter because he was observing the Shuttle's three main engines. Once the main engines shut-down, N3KVQ reported that STS-56 disappeared into the night sky. At the same time, the radio amateurs at the club station of the Goddard Space Flight Center (GSFC), WA3NAN, noted that they too saw STS-56 fly past their QTH. N8FGV noted that STS-56 looked like a comet streaking across the sky.

With all systems working nominally aboard STS-56, including the Shuttle Amateur Radio Experiment (SAREX), all amateurs are invited to make contacts with the all ham crew of STS-56. For review, the following table summarizes the important frequency information for this SAREX mission.

SAREX Frequencies	Shuttle Downlink Frequencies	Shuttle Uplink 2M FM Voice Frequencies
U.S., Africa, South America, & Asia	145.550 MHz	144.9949 MHz
	145.550	144.9700
	145.550	144.9500
	145.550	144.9300
	145.550	144.9100
Europe	145.550 MHz	144.800 MHz
	145.550	144.750
	145.550	144.700

AT NO TIME, SHOULD YOU EVER TRANSMIT ON THE SAREX DOWNLINK FREQUENCY OF 145.550 MHz. The packet uplink frequency will be 144.490 MHz and the downlink frequency will again be 145.550 MHz. The astronauts wish to remind those on the ground to wait until the Shuttle Discovery is a few degrees above the horizon so that you can hear the operator announce which uplink frequency is being used. At no time will the crew of STS-56 favor any particular frequency so your chance of making a connact will be based on the "luck of the draw."

The primary callsign to be used for the 2M FM voice contacts will be that of Ken Cameron (KB5AWP). The callsign for the packet station will be W5RRR-1 which many will recognize as the the callsign for the Johnson Spaceflight Center's (JSC) radio club of W5RRR. Likewise, the callsign to be used during SSTV operations will be W5RRR/S. The ATV contacts will only be made on prearranged schedules.

[The ANS would like to thank Frank Bauer (KA3HDO) of the SAREX Working Group for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-100.02
INFORMATION SOURCES DURING STS-56

HR AMSAT NEWS SERVICE BULLETIN 100.02 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.02

AMSAT, ARRL, WA3NAN, And W5RRR To Provide Up-To-The-Minute Information

During the STS-56 SAREX mission radio amateurs can get up-to-the-minute information about the SAREX operations from the AMSAT News Service (ANS) bulletins and the many weekly AMSAT HF and VHF nets around the world. Also, the Goddard Amateur Radio Club in Greenbelt, MD will re-broadcast the shuttle voice audio as it has done on past SAREX missions. Included in these broadcasts will be the latest keplerian element set so that radio amateurs can predict Acquision-of-Signal (AOS) and Loss-of-Signal (LOS) times for STS-56. Likewise, the John Spaceflight Center (JSC) radio club, W5RRR, will also be a source for SAREX information. The following is the list of HF and VHF frequencies that radio amateurs can tune in on to find out the latest status of STS-56.

GSFC ARC WA3NAN Planned HF Operating Frequencies For SAREX Bulletins

3.860 MHz 7.185 MHz [Note: If you live in the Greenbelt, MD
14.295 Mhz 21.395 MHz or Washington, DC area, you can listen
28.650 Mhz to WA3NAN re-broadcast on 147.450 MHz.]

JSC ARC W5RRR Planned HF Operating Frequencies For SAREX Bulletins

7.225 MHz 28.650 MHz [Note: If you live in the Houston, TX
14.280 Mhz area, you can listen W5RRR's shuttle
21.395 Mhz re-broadcast on 146.640 MHz.]

Also, the ARRL's station, W1AW, will provide SAREX mission bulletins and keplerian elements during its daily bulletin broadcasts. See this months QST for information on the times and frequencies for W1AW's bulletin broadcasts. If you would like to find out about the technical details of the various scientific payloads on this particular shuttle mission, you are invited to call into the JSC landline BBS. To connect to the JSC BBS, use 1200 baud with 8 bits, no parity, and one stop bit, (8-N-1 1200 baud), and dial (713) 483-2500 then type 62511.

[The AMSAT News Service (ANS) would like to thank Frank Bauer (KA3HDO) for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-100.03
STS-56 LATEST ORBITAL ELEMENTS

HR AMSAT NEWS SERVICE BULLETIN 100.03 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.03

Latest STS-56 Keplerian Elements

These elements are as of orbit 18 and were derived from NORAD tracking data, relayed by GSFC, converted at Johnson Space Center (JSC) and provided

courtesy of Lou McFadin (W5DID) and Gil Carman (WA5NOM) at JSC radio club
of W5RRR.

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STS-56
1 22621U 93 23  A 93099.35573237 0.00060694  00000-0  17456-3 0    65
2 22621  57.0004 173.7108 0006458 269.1315  90.9023 15.92628514   183

Satellite: STS-56
Catalog number: 22621
Epoch time:      93099.35573237         (09-APR-93   08:32:15.28 UTC)

Element set:     GSFC-006
Inclination:       57.0004 deg
RA of node:       173.7108 deg          Space Shuttle Flight STS-56
Eccentricity:    0.0006458                  Keplerian Elements
Arg of perigee:   269.1315 deg
Mean anomaly:      90.9023 deg
Mean motion:   15.92628514 rev/day      Semi-major Axis: 6673.0627 Km
Decay rate:     6.0694E-04 rev/day*2    Apogee  Alt:        298.98 Km
Epoch rev:              18              Perigee Alt:        290.37 Km
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/EX
SB SAT @ AMSAT $ANS-100.04
STS-56 QSL INFORMATION

HR AMSAT NEWS SERVICE BULLETIN 100.04 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.04

STS-56 QSL Information

All radio amateurs and short-wave listeners (SWL) are invited to send their signal reports and QSL cards to the following address for this STS-56 SAREX mission.

QSL Info: Send you QSL or Listeners Report to:

STS-56 QSL
c/o Vienna Wireless Society
P.O. Box 418
Vienna, VA 22183

Please include a self-addressed-stamped-envelope. Non-US stations should include the appropriate number of IRCs with your QSL.

Report should include callsign, whether worked/heard, date, UTC time, mode, frequency, and QSO number for packet connects.

/EX
SB SAT @ AMSAT $ANS-100.05
AMSAT OPS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 100.05 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.05

AMSAT Operations Net Schedule

AMSAT Operations Nets are planned for the following times. Mode B Nets are conducted on an AO-13 on a downlink frequency of 145.950 MHz and Mode J/L
on a downlink of 435.970 MHz.

Date	UTC	Mode	Phs	NCS	Alt NCS
19-Apr-93	0130	B	95	WB6LLO	WA5ZIB
24-Apr-93	1730	B	65	WA5ZIB	WJ9F
2-May-93	0000	J	135	W9ODI	N7NQM

Any stations with information on current events would be most welcome. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations are encouraged to join the OPS Nets. In the unlikely event that either the Net Control Station (NCS) or the alternate do not call on frequency, any participant is invited to act as the NCS.

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Slow Scan Television on AO-13

SSTV sessions will be held on UTC Saturdays and Sundays:
Mode J Downlink 435.980 MHz
Mode B after J Downlink 145.960 MHz

OPS NETS will take priority, look for SSTV activity immediately after the net. SSTVer's are invited to join the Net to make schedules at other times if desired.

/EX
SB SAT @ AMSAT $ANS-100.06
AO-21/RS-14 STATUS REPORT

HR AMSAT NEWS SERVICE BULLETIN 100.06 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.06

PY2BJO Provides First Status Report Of AO-21/RS-14 Digi-Talker Activities

This is the first BRAMSAT Status Report for AO-21, an amateur radio satellite, designed and built by radio amateurs to be used by all those who are interested in the satellite communications, be they amateurs, SWLs or not.

First, BRAMSAT would like to thank all who have taken the time to observe and listened to the "Oscar 21" signals, as well as to be sending us your signal reports. We are extremely grateful and surprised by the hundreds of letters and QSLs sent by such a large number of HAMs, SWLs, young students, and non-technical listeners who are intrigued by the signals, the digital voice mesages, and its telemetry. Some, with QSLs and letters, have presented us with suggestions, and others with comments and a large number asking for technical information concerning AO-21. From this point now, BRAMSAT intends to publish monthly status reports informing all about the news on "Oscar 21".

As of the day of this report, 07-APR-93, we have received more than 500 QSLs and letters from over 26 countries, and from the first 234 QSLs received we are extracting words, which for us, are words of enthusiasm, eulogy and encouragement.

As we have noted that most of the QSLs are asking for information about AO-21, but there are also a large number of listeners which are passing along to us greetings and praise for our initiative with AO-21. Such greetings and eulogy are also extendend in letters, QSLs, and reports to AMSAT-DL and AMSAT-UA groups for their initiative in making this satellite

available for use to all the people of the world. A small number of the correspondences have presented us with suggestions, as we requested in our digi-voice message, for the use of the "Oscar 21" digi-talker. BRAMSAT would like to hear from all those who hear the signals from AO-21 and we encourage you to send us your suggestions and ideas for other applications of this satellite.

In reading the letters which have reached us, it is our impression is that this application of AO-21's digi-talker is a big success, but we wish to discover what is the right way to use this valuable resource, and we feel that this will can only be accomplished through the inputs of all those which want to be involved in the matter. In short, we are looking for ideas from of our listeners.

Many of the letters we have received have come from children. Some have listened to the AO-21 signals on their father's or grandfather's radios. At BRAMSAT, we consider the letters from the children to be very special and each child will receive a special correspondence from BRAMSAT. We feel that we must to encourage and help children to discover the exciting world of amateur radio.

Some of the listeners have asked us for photos of AO-21. We are requesting the pictures from the Support Team in Germany and in Russia in order to that we can respond to this request. All those that have requested a photo of AO-21 can expect one to be sent soon.

With the following technical information, we will try to pass along the general information about AO-21/RS-14 and its modes of operation. However, you can find more technical information in the Oscar News (AMSAT-UK journal), and Oscar Satellite Report (R. Myers Communications - USA) references listed at the end.

[The AMSAT News Service would like to thank PY2BJO for this bulletin item.]

/EX
SB SAT @ AMSAT $ANS-100.07
AO-21/RS-14 FREQUENCY INFO

HR AMSAT NEWS SERVICE BULLETIN 100.07 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.07

AO-21/RS-14 Frequency & Modes Summary

AO-21/RS-14 is a Low Earth Orbit (LEO) satellite. It is orbiting the Earth at an altitude of 1000 KM, positioned at an inclination of 83 degrees, almost polar orbit, with perigee of 958 KM and apogee of abouth 1000 KM. The orbital period is about 105 minutes, the visibility window of about 15 to 20 minutes and 797 days have past since it was launched "piggy-back" onboard of the Russian Geological Research Satellite (GEOS), also know as INFORMATOR-1 which is the host satellite, from the North Cosmodrome of Plesetsk, Russia, using a Russian launcher. It was made jointly by efforts of AMSAT DL and AMSAT-U-ORBITA - now AMSAT-UA, Russia.

AO-21/RS-14/RADIO M-1 is the designation of the amateur satelite. AO-21 says AMSAT-OSCAR-21, and its number means it is the twenty-first bird launched by amateurs; RS-14 is Radio Sputnik -- the name it received once in orbit -- as the Russians call their amateur satellites. M-1 is because it is the first joint project AMSAT-DL and AMSAT-U-ORBITA. Finally "M" is due to the fact that the Team Group involved are located at Molodechno, near Minsk. RUDAK is the call sign for packet radio operations.

"RUDAK" describes the concept of "Regenerating Transponder for

Digital Amateur Radio Communications".

Regenerating means that all signals received are merely retransmited on another frequency, but they are demodulated down to the data stream level. In addition to several other advantages, a complete segregation of the up and down-link is achieved. The links can optimized and the data stream can be processed in onboard computers or other intelligent processing. This particular aspect is important on the scope of the RUDAK experiment.

The needed uplink power at 435 MHz is about 100 watts EIRP, but in fact as few as 10 watts is usually suffice. On the downlink, 145 MHz, the power output is 10 watts. It is important to point out that the AO-21/RS-14 draws it's power from the host GEOS satellite.

It is using a linear polarized dipole antenna for transmission on 145 MHz and right hand circular polarized Helix receiving antenna for 435MHz.

RUDAK-2 is a digital transponder digipeater that utilizes the AX.25 protocol to "store-and-forward" packet radio communications, and is also a telecommunications experiment with digital signal processor and 1 MByte of RAM disk space.

The Uplink frequency for this system are:

RX-2 435.155 MHz (AFC) 2400 bps, BPSK, Biphase-s
RX-3a 435.193 MHz (AFC) 4800 bps, RSM
RX-3b 435.193 MHz (AFC) 9600 bps, RSM
RX-4 435.041 MHz (Digital AFC) RX for RTX-DSP

The downlink frequency is on 145.987 MHz - 3 watts of RF output produces a strong signal. This downlink can be switched to several different operating modes given below:

Mode 1 1200 bps, BPSK, NRZI, (NRZ-S), Link Pacsat/FO-20
Mode 2 400 bps, BPSK, Biphase-S, (like AO-13's beacon)
Mode 3 2400 bps, BPSK, Biphase-S
Mode 4 4800 bps, RSM, NRZIC, (Biphase-M) (as 4800 bps uplink)
Mode 5 9600 bps, RSM, NRZI (NRZ-S)+Scramble (as 9600 bps u/l)
Mode 6 CW (used only for special events)
Mode 7 FSK (F1 or F2B) e.g.: RTTY, FAX, SSTV, etc., (this is used normally for special events)
Mode 8 FM modulated using D/A signals from DSP-RISC processor.

In this latter mode on RUDAK Uplink #1 that is providing the present 435.016 MHz Up to 145.987 MHz Down FM speech transponder facilities that we are now hearing for most of the time of a pass. Although centered in 435.016 MHz, the Uplink varies from 435.007 MHz at the AOS (Acquisition of Signal) through 435.025 MHz at LOS (Loss of Signal) time. And the nominal downlink frequency of 145.987 MHz varies from 145.990 MHz at AOS to 145.984 MHz on a maximum elevation pass.

This system, like any conventional FM repeater, does not support multiples stations at one time. This will require that only two station be talking each time. Thus, to avoid unnecessary QRM and loss of oportunity to many others operators, many of them with low power -- mobiles, portable stations with less than 10 watts -- so that they will have a chance for a two-way contact via AO-21/RS-14, we strongly recommend that stations using the "Oscar 21" avoid the use of high power. Some non-amateur stations in 70 cm band were noted as causing false command problems, which subsequently caused the automatic switching of the -12 dB attenuator on the receive input. On the other hand, without attenuator it would not be possible to make contacts between Europe and USA.

The "Oscar 21" transponders are operationally active in various

modes, as described below:

Transponder #1

Mode B Uplink 435.022 - 435.102 MHz SSB, CW.
Mode B Downlink 145.852 - 145.932 MHz SSB, CW inverting.

Beacons 145.822 MHz CW. 145.952 MHz BPSK FM 1100 bps
145.983 MHz BPSK/SSB

Transponder #2

Mode B Uplink 435.043 - 435.123 MHz SSB, CW
Mode B Downlink 145.866 - 145.946 Mhz SSB, CW inverting

Beacons 145.948 MHz CW. 145.838 MHz BPSK/FM 1100 bps
145.800 MHz BPSK/FM.

RUDAK-2 Transponder

Uplink 1 435.016 MHz 1200 bps Manchester AFSK/FM
Uplink 2 435.155 MHz 2400 bps BPSK/FM
Uplink 3A 435.193 MHz 4800 bps BPSK/FM
Uplink 3B 435.193 MHz 9600 bps BPSK/FM
Uplink 4 435.041 MHz Digital Signal Processor Input
Downlink 145.983 MHz (Various modes).

Mode 1 Pacsat/FO-20 Compatible
Mode 2 AO-13 400 bps BPSK Compatible
Mode 3 AO-13 RUDAK I Compatible
Mode 4 4800 bps
Mode 5 9600 bps
Mode 6 CW
Mode 7 FSK (F1 or F2B) RTTY, FAX, SSTV, etc.
Mode 8 FM using D/A converter and DSP output.

"One reason you want to go listen to OSCAR 21, if you haven't already done so, is because as an experimental bird, it may switch off this Mode any time." "There are other experiments aboard the spacecraft that will cause a need for the Mode to change to another one of the eight Modes of capability. (OSCAR Satellite Report # 252, Sept. 01 1992).

As was mentioned in the OSCAR Satellite Report -- OSR #251/252, it can be used for bulletins, news, educational purposes, emergency traffic. References to AO-21/RS14 are made in the OSR #259, DEC/1992.

Detailed informations can also be found in find Oscar Satellite Report # 251, 252, 259, among others, which you can from R. Myers Communications P.O. Box 17108, Fountain Hills, AZ - USA, and in OSCAR NEWS # 85 OCT/1990, # 87 FEB/1991 and 99 FEB/1993 (AMSAT-UK journal) that you can try to get from AMSAT-UK, letter addressed to the Secretary, 94 Herongate Road, Wanstead Park, London E12 5EQ, ENGLAND.

/EX
SB SAT @ AMSAT $ANS-100.08
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 100.08 FROM AMSAT HQ
SILVER SPRING, MD APRIL 10, 1993
TO ALL RADIO AMATEURS BT
BID: $ANS-100.08

Weekly OSCAR Status Reports: 03-APR-93

AO-13:
L QST *** AO-13 TRANSPONDER SCHEDULE *** 1993 Mar 22 - May 10
Mode-B : MA   0 to MA 90 !
Mode-BS : MA 90 to MA 120 !<- Mode-S Transponder;Mode-B Transponder is ON
Mode-S : MA 120 to MA 130 !<- Mode-S Transponder;Mode-B Transponder is OFF
Mode-LS : MA 130 to MA 135 !<- Mode-S Beacon + Mode-L Transponder
Mode-JL : MA 135 to MA 150 !   Blon/Blat 180/0
Mode-B : MA 150 to MA 256 ! Move S/C attitude to 210/0 on 10-May-93

Please don't uplink to the Mode-B transponder during MA 120-130. Your uplink
transmissions will interfere with Mode-S users. Inorder to further encourage Mode-S enthusiasts and the use of the AO-13's Mode-S transponder, Mode-S is now ON for an additional 30 MA units, i.e. MA 90 to MA 135. During MA 90-120 you will have to endure the coupling from Mode-B users operating at 145.880-145.920 MHz. Either work between them, or use their signals as test signals. MA 120-130 is a Mode-S transponder exclusive (plus Mode-B beacon). MA 130-135 is Mode-S beacon (plus Mode-L transponder). [G3RUH/VK5AGR/DB2OS]

FO-20: The FO-20 ground control station, JJ1ZUT, announced that FO-20

operational schedule during April is follows:

    Analog Mode Operation:
    07-APR-93 09:52 UTC <---> 08-APR-93 10:12 UTC
    21-APR-93 10:45 UTC <---> 22-APR-93 11:00 UTC

    High Speed Telemetry Collection Mode Of Operation:
    12-APR-93 11:30 UTC <---> 19-APR-93 11:53 UTC

During the high speed telemetry collection period, FO-20's mailbox BBS is closed, however, FO-20 is available as a digipeater. The digital mode will be in operation unless otherwise noted above. [Kazu Sakamoto, JJ1WTK/3]

/EX